In Fig. 4, oX representing the direction of sunset or "sunrise," my object is to show that a cloud high up, say at x, when the sun has set so long as to be at S^3 instead of at X can really receive light from the sun, and the distance xs''' added to ox will represent the total amount of atmospheric absorption undergone by the light. It is under these conditions, too, that, in consequence of the reduced illumination of the background, the sky puts on its most beautiful green, which I think is partly a physiological effect due to the molecular constitution of the retinas of our eyes. Similarly, by drawing a line from S^1 we can see how a cloud absolutely in the zenith of the observer at o may have its colour transformed by a considerable atmospheric absorption *after sunset.*

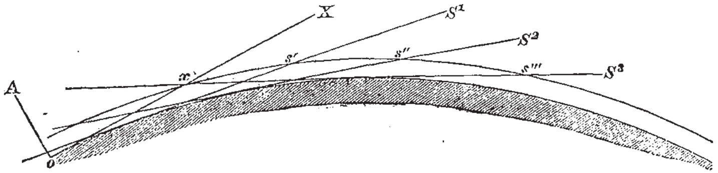

FIG. 4.

J. NORMAN LOCKYER

THE MICROPHONE IN SURGERY

ON Tuesday at 3 P.M., before a crowded audience of students and medical men, Sir Henry Thompson gave a demonstration in the anatomical theatre, University College, on the microphone as applicable in operations for stone.

In old days, the lecturer said, patients used to be sent away when they came to the doctor "because their case was not ripe.." The risk involved in the operation of cutting for stone was so serious that a surgeon seldom liked to undertake it except under compulsion, and when cutting had to be resorted to it was not much more difficult to remove a large than a small calculus. In the newer operation of stone-crushing it was better, of course, to have the stone to be crushed as small as possible, and it was essential to deal with the smallest fragments to which the operation reduced it. It was often said, indeed, in objection to lithotrity that to leave even the smallest fragment as a nucleus was to render further treatment necessary and, in time, inevitable. However that might be, it was clearly important to be able to deal with the smallest calculus in the bladder.

Before going further, Sir Henry Thompson emphatically stated that in his belief the present methods of lithotrity are quite sufficient in the hands of any surgeon of fair practice in the operation to enable him to deal successfully at all events with almost every case. He compared the use of the new instrument which he was going to describe to that of the endoscope for the urethra, which, however satisfactory on paper, had not been found important in practice, or, better perhaps, to that of the higher powers of the microscope, which were not necessary nor perhaps even advantageous in ordinary work, but which were a valuable resource in questions of unusual difficulty.

The apparatus consisted of the ordinary feeble battery with wires, connected with two telephones running to different parts of the room, and applied to the ears of the listeners. The ordinary Sound used in operations for crushing the stone was attached by a wire to the circuit of the battery. Near the handle a piece of carbon, such as is used by Prof. Hughes, was carefully balanced and attached by a delicate spring to the battery circuit. When the end of the sound strikes against the smallest piece of calculus the acoustic wave is transmitted along the steel of the instrument to the carbon, where it is transformed into electric vibrations, which are multiplied through the telephone, so that the noise becomes loud and unmistakable. But Sir Henry Thompson pointed out that in practice many things might interfere with the advantageous use of the instrument. The carbon arrangement on the sound must not be too delicate—not such, for instance, as could make us hear the walk of the fly like the tramp of an elephant—else the mere friction of the instrument on the walls of the bladder would produce a noise quite capable of being confounded with that caused by the presence of calculus. The battery must not be too strong, else mere accidental friction of the wires or the noises of the room would produce a distinct sound in the telephone. But when care was taken there would be no difficulty in detecting the noise. An ordinary calculus was put in a bladder in a basin of water, and the listeners could distinctly hear the different noises produced by the point of the sound rasping against the walls of the bladder or striking the stone. A sharp stroke of the former was sometimes not quite unlike the latter. But with the microphone properly adjusted, and the battery not too strong, it was not easy by trial to detect the presence of even a minute fragment of unremoved calculus in the bladder. The carbon needed only to be fitted to the probe, of course, to detect bullets or fragments of bone. But while it was quite possible for a skilful surgeon to make himself absolutely certain by means of the microphone of what he was previously only morally convinced of, Sir Henry Thompson did not appear to anticipate any very remarkable results, at least in ordinary practice, from the use of the instrument.

NOTES

WE are happy to state that a Commission appointed by the French Chamber of Deputies has reported favourably on the erection of a large observatory at Meudon, on the site of the Château which has been in ruins since the Franco-German war. The credit given is 690,000 francs, which will be paid in two instalments, 345,000 in 1878, and 345,000 in 1879. A large part of that sum, 390,000 francs, is destined for the construction of a large refractor, 250,000 francs are for the buildings, and 50,000 francs for the salary of M. Janssen, his assistants, and petty expenses during two years. The credit will be voted very likely *nemine obstante.*

WE learn, with much satisfaction, that the Swedish Diet has granted the necessary funds to the Meteorological Observatory at Upsala, so well known for the high excellence of its work, and that it will commence its new course as a separate institution, distinct from the Astronomical Observatory, on January 1, 1879.

ON Thursday, May 30, Dr. Gladstone, F.R.S., P.C.S. gave a *soirée* to the Fellows of the Chemical Society at Burlington House. Amongst the numerous objects of interest were the following :—A magnificent collection of immediate principles from the brain exhibited by Dr. Thudichum, who also demonstrated the absorption spectrum of a new colouring matter, derived from eggshells, the bands being identical with those of cruentin, obtained from the blood. In the library were specimens of artificial corundum and emerald, made by Feil and Frémy; a large Cape diamond, exhibited by Prof. Tennant; a collection of precious stones from Hunt and Roskell, including a fine pink topaz, cat's eye, and a large crystal of garnet; some interesting apparatus of Faraday, amongst which was his rheostat; a collection of alkaloids from opium, aconite, &c., by Dr. Wright; a splendid case, by W. H. Perkin, illustrating the colouring matters from aniline, anthracene, &c.; a specimen of artificial alizarin and preparations of natural and artificial salicylic acids, the latter of which the exhibitors, Messrs. Hopkin and Williams, have succeeded in obtaining in crystals exactly resembling those of the natural product. Minerals containing liquid carbonic acid were shown by W. N. Hartley, who also demonstrated the effect of heat on the liquid inclosed in the cavities: crystals from Owens College, including a large, almost perfect octohedron of chrome alum; various interesting products, &c., were exhibited by Prof. Odling, Prof. Frankland, Dr. Russell, Dr. Armstrong, Dr. Witt, Dr. Schorlemmer, Dr. Hugo Müller, and M. M. P. Muir. In the room adjoining the lecture-room were some candles which had been acted upon by sea-water for 173 years, a large collection of meteoric stones, an interesting series of photographs of invisible fluorescent bodies, &c., exhibited by the President; a splendid photograph of the solar spectrum, shown by Mr. Rutherfurd; the spectrum of bismuth was shown by Mr. Browning; dichroic crystals of nickel and cobalt salts, by J. M. Thomson; photographs illustrating his recent researches in solar chemistry, by J. N. Lockyer; an enormous cut cairngorm, weighing 51 oz.; an opal cameo, and various minerals, by Bryce Wright, &c. In the lecture and preparation rooms were the microphone, exhibited by Prof. Hughes, which attracted considerable interest; Mr. W. De la Rue showed some phosphorescent tubes which, after a momentary exposure to some burning magnesium, flashed back all the colours of the spectrum; Byrne's pneumatic battery, and the copper zinc couple were shown in action; Messrs. Murray and Heath exhibited, under the microscope, some pretty crystals of gold, silver, &c.; Sir Joseph Whitworth and Dr. Siemens showed specimens of steel; in the same room Dr. Guthrie exhibited the formation of cryohydrates. Many other objects of interest were exhibited, but it would be impossible to enumerate all. The *soirée* was most successful, and although the attendance was numerous, the arrangements were so good that at no time were the rooms inconveniently crowded.

The publication of a work on the algæ of North-America, to consist of the plants themselves properly put up and labelled, was commenced a year ago by the three eminent American algologists, Dr. W. G. Farlow, of Cambridge, Prof. D. C. Eaton, of Yale, and Dr. C. L. Anderson, of California. A second fasciculus has lately appeared, and maintains the high character of the first.

The death is announced of the venerable Baron von Ettingshausen, in his eighty-second year. We hope to give some notice of his life next week.

M. Mascart, the new director of the French Central Meteorological Bureau, took possession of the *Bulletin International* on June 1, without making any alteration in the nature of its contents or its periodicity. On the preceding day he visited for the first time the meteorological division of the observatory, and warned the officials to prepare for being removed from the establishment at an early date, their rooms being wanted for enlarging the astronomical service. Thus the principle of separation will be carried into effect very shortly. We are glad, however, that M. Mascart stated that the services of M. Leverrier's assistants had been quite appreciated by the Government. None of them will lose their present situations, and an increase of their present salaries is contemplated. The head of the Warning Service for Agriculture and Marine is M. Fron, a former pupil of the Normal School, and the sub-director, M. Moureau, a former teacher in the Mutual Schools, whom M. Leverrier had distinguished for his activity and ingenuity. The present staff is composed of a few subordinates acting merely as computers, an autographist, and a telegraphist.

We notice the death, on May 14, in Dresden, of Prof. Wilhelm Friedrich Georg Behn, an able anatomist and zoologist. He was born in Kiel in 1808, and, after the completion of his scientific studies, entered as private docent in the Kiel University, where he received the chair of zoology in 1852. After the annexation of Schleswig-Holstein to Prussia he exchanged his professorship for one in Dresden. Here he was elected, in 1869, to the presidency of the Leopoldina-Carolina Akademie der Naturforscher, a position which he occupied up to his death. The academy, although the oldest in Germany—being founded in 1652—was then nearly on the point of dissolution. Prof. Behn's energetic efforts succeeded, however, in resuscitating it, and rendering it once more the centre of Saxon scientific life.

At a general meeting of the Royal Irish Academy on Monday last week Cunningham gold medals were awarded to Dr. Aquila Smith for his inquiries into Irish numismatics; Dr. Allman, F.R.S., for his researches into the natural history of the Hydrozoa; and Dr. Casey for his important mathematical discoveries.

The Dutch Society of Sciences held its 126th general meeting on May 18. It was at this meeting that the Huygens Medal was awarded to Prof. Newcomb, who, along with Sir George Airy, Dr. Auwers of Berlin, Prof. Du Bois Reymond of Berlin, M. V. Duruy of Paris, and Dr. C. F. W. Ludwig of Leipzig, were elected foreign members. For a paper on the question "What are the meteorological and magnetic phenomena which there are sufficient reasons for believing are connected with solar spots," Prof. Fritz of Zurich Polytechnic, was awarded a prize of 150 florins. The proposer of the question, Dr. Buys Ballot, was awarded a silver medal. A number of subject for prizes were proposed for competition in 1879 and 1880, the most important of which we hope to give next week.

In the June number of the *American Journal of Science and Art* Prof. Marsh announces one of the most interesting discoveries yet made in the Palæontology of the Rocky Mountains, which have lately produced so many novelties. This is the right lower jaw of a small opossum, of the family Didelphydæ, for which he proposes the name *Dryolestes priscus*, from the Upper Jurassic series, in which no mammalian remains have previously been found in America.

The first annual meeting of the Midland Union of Natural History Societies on May 27, at Birmingham, was, we are glad to say, a great success. After a luncheon given by the president, Mr. Tonks, a meeting was held at 3 P.M. in the Midland Institute, which was largely attended, as was also the brilliant *conversazione* in the evening in the town-hall. An excursion to Dudley on Tuesday, attended by about 400 members and their friends, brought to a close a pleasant and profitable meeting.

The annual meeting of the Sanitary Institute was held on Friday last, Dr. B. W. Richardson, president, in the chair. It was shown that the Institute had already done good work, and exercised a decided influence in relation to sanitary matters. Dr. Richardson was re-elected president.

THE Tay Bridge, at Dundee, was opened on Friday, in presence of a large and distinguished company.

TWO Reports come to us from Scotland—one on the Glasgow Industrial Museum, and the other on the Dundee Free Library. From the former we are glad to see that, under the energetic curator, Mr. James Paton, F.L.S., the Glasgow Museum is gradually becoming worthy of the second city of the kingdom. Many important additions are being made to the well-arranged museum, with which, we see, have been incorporated the Corporation Galleries of Art. We trust the successors of "Bailie Nicol Jarvie" and his contemporary councillors will exercise a wise liberality and speedily raise their museum to the position it ought to occupy. From the Report of Mr. Maclauchlan we are pleased to see that scientific works are in considerable demand among the busy people of enterprising Dundee. The interesting museum, also, is gradually becoming possessed of that complete collection of the Arctic fauna which strangers naturally look for in the museum of the chief seat of the whaling trade.

IN the *Annalen der Hydrographie* we notice the account of a group of three islands discovered by Capt. Caller in 1877 on the north-west coast of Australia. These islands, which in their highest point do not rise more than thirty feet above the level of the sea, are covered with a thick deposit of guano, containing an unusual amount of ammonia and phosphates. On account of their nearness to the continent these valuable deposits will probably play an important part in the agricultural development of Australia.

ON October 4 last we gave an account of the post-mortem examination of a white whale (*Beluga*) that died after a few days' residence in a tank at the Westminster Aquarium. Mr. Farini then commissioned Zack Coup to obtain three more and bring them over from Labrador. They were packed each in a separate box lined with sea-weed, and four men were engaged to relieve one another in throwing water over the heads of the animals during the entire voyage. On Tuesday, May 27, they arrived at Liverpool, when one specimen was sent to Blackpool, one to Manchester, and one was brought under the personal care of Mr. Farini and Mr. Carrington, the naturalist of the Aquarium, to Westminster. This London specimen is 13ft. 6in. long, and arrived in apparently good condition. On Friday it was found requisite to "sling" it in order to remove an eel that had become entangled in its right flipper, when its quick sight in trying to avoid the sling was noticed with interest. The legs of a man sitting on the edge of the tank it carefully avoided, but it did not seem to mind the presence of those standing round. After the whale had been in the tank four days an indication of malaise and apparently of some accident having occurred attracted the careful attention of those who had charge of it. It was then ascertained the specimen was a female, and was for a while a subject of interest to physiologists especially.

A NEW improvement in the microscope is reported from Germany. Herr I. von Lenhossék has constructed an apparatus which permits no less than sixty microscopical preparations being observed in immediate succession, without the trouble of changing the slides and readjustment of the object-glass. Its construction is similar in principle to that of the well-known revolving stereoscopes, and the inventor has given the new apparatus the name of "polymicroscope."

UPON the occasion of unveiling the statue of Giordano Bruno, which will take place at Rome on February 19, 1879, a new edition of his works will be published. They are being reprinted at the expense of the Italian government.

THE Vienna Academy of Sciences held its annual public session on May 29, in the presence of representatives of the Court and Government. After the announcement of the various prizes and reports on the progress in the several sections of the Academy, Prof. Hann delivered an address on the "Problems of Modern Meteorology."

AN Ethnographical Exhibition, organised by the Anthropological Society of Paris in an annexe to the Trocadero, was opened on May 31. M. Teisserenc de Borg, Minister for Commerce and Agriculture was present on behalf of M. Bardoux, the Minister of Public Instruction, and declared the exhibition open. The addresses were delivered by MM. Quatrefages, Henri Martin, the president of the Society, and Dr. Broca. This exhibition is an extension of the Provisional Museum established for some months at the Palais de l'Industrie, in the Champs Elysées.

WE noticed at the time that M. Jules Simon, when French Minister for Public Instruction, had opened in the buildings of the Ministry, a provisional Pedagogical Museum, but a change having supervened in the Cabinet the scheme was dropped. It will, we learn now, be revived by M. Bardoux, who has asked special credit for that purpose from the Chamber of Deputies.

THE electric-light display in the Paris streets and thoroughfares is becoming one of the attractions of Paris. Eight electric lamps have been placed in the Place de l'Opéra, twenty-four others in the Opera Avenue, and eight more on the Place du Théâtre Français. Six lamps were lighted for the first time on June 1 on the part of the Palais Bourbon facing the Place de la Concorde. We should notice also the private illumination of the Grands Magasins du Louvre, about seventy lamps; Belle Jardinière, eight; Concert de l'Orangerie des Tuileries, twenty; and the Hippodrome, thirty-two. This last illumination, being in a closed building, cannot be viewed from the streets. All these illuminations are made by the Jablochkow candles. An electric lamp has been placed also on the top of the Trocadero Palace.

WE notice that the list of jurors for the Paris Exhibition has been gazetted.

THE last number of the *Journal* of the Society of Arts contains a valuable paper, recently read by Mr. J. M. Thomson, F.C.S., before the Society, on the Position of Chemistry in a System of Technical Education, as illustrated by some of its Applications. We are glad to see the Society turning its attention to a subject of such great importance.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. J. Farmer; a Geoffroy's Cat (*Felis geoffroii*) from Uruguay, presented by Mr. Ronald Bridgett; a Brazilian Caracara (*Polyborus brasiliensis*) from South America, presented by Miss Amslie; a Tamandua Anteater (*Tamandua tetradactyla*) from South America, deposited; a White-eared Bulbul (*Pycnonotus leucotis*) from North-west India, received in exchange; four Temminck's Tragopans (*Ceriornis temminckii*), bred, a Yellow-footed Rock Kangaroo (*Petrogale xanthopus*), an Axis Deer (*Cervus axis*), born in the Gardens.

THE REDE LECTURE[1]

WHEN, about two years ago, news came from the other side of the Atlantic that a method had been invented of transmitting, by means of electricity, the articulate sounds of the human voice, so as to be heard hundreds of miles away from the speaker, those of us who had reason to believe that the report had some foundation in fact, began to exercise our imaginations in picturing some triumph of constructive skill—something as far surpassing Sir William Thomson's Siphon Recorder in delicacy and intricacy as that is beyond a common bell-pull. When

---

[1] Given at Cambridge by Prof. Clerk-Maxwell, F.R.S., May 24, 1878 Subject—"The Telephone."